Jet Structure Topical Update

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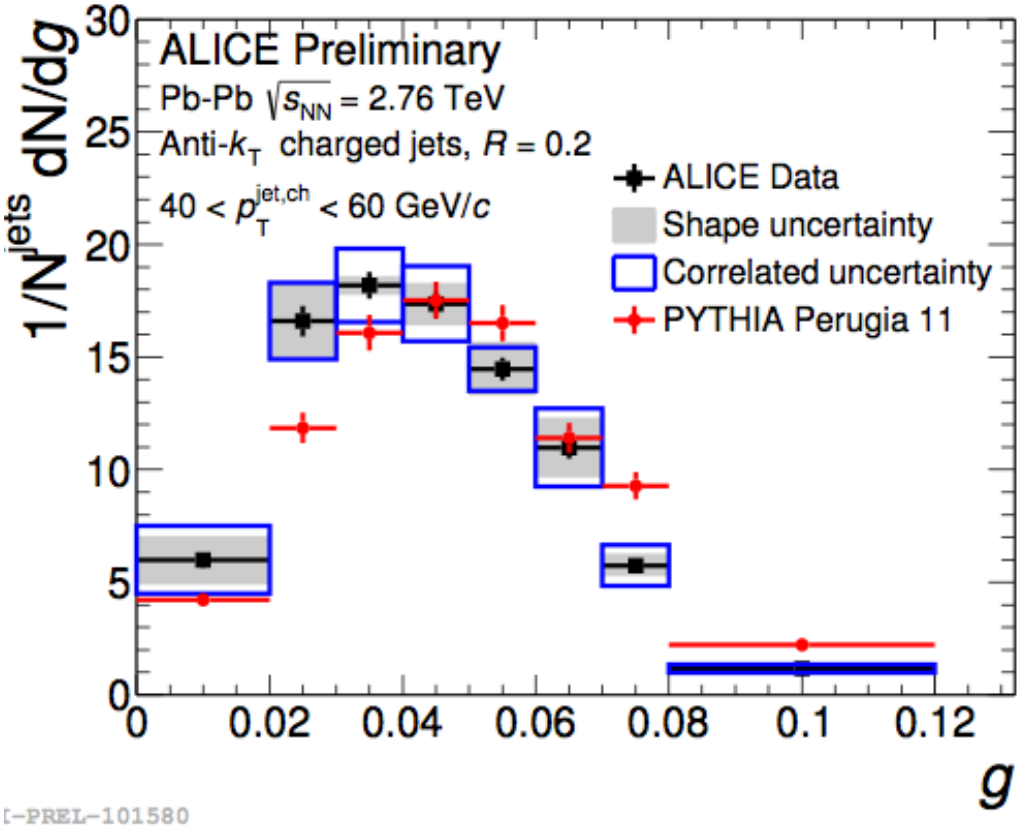
Jet structure in the RHIC and LHC era

- Jet measurements in heavy-ion collisions have evolved in the last year
  - Truly the era of jet structure
  - HEP inspired observables
- Which observables should the next generation jet (and ϒ!) detector focus on?
  - $\sqrt{S_{NN}}$ dependence
    - 200 GeV vs 2.76, 5 TeV
  - Focus on differential measures at 200 GeV
- Jet grooming, jet fragmentation, jet mass, $N_{subjets}$, γ-jet, jet shape, jet girth

$$g = \frac{\sum_{tracks} p_{T,track} r}{p_{T,jet}}$$



sPHENIX Jet structure goals

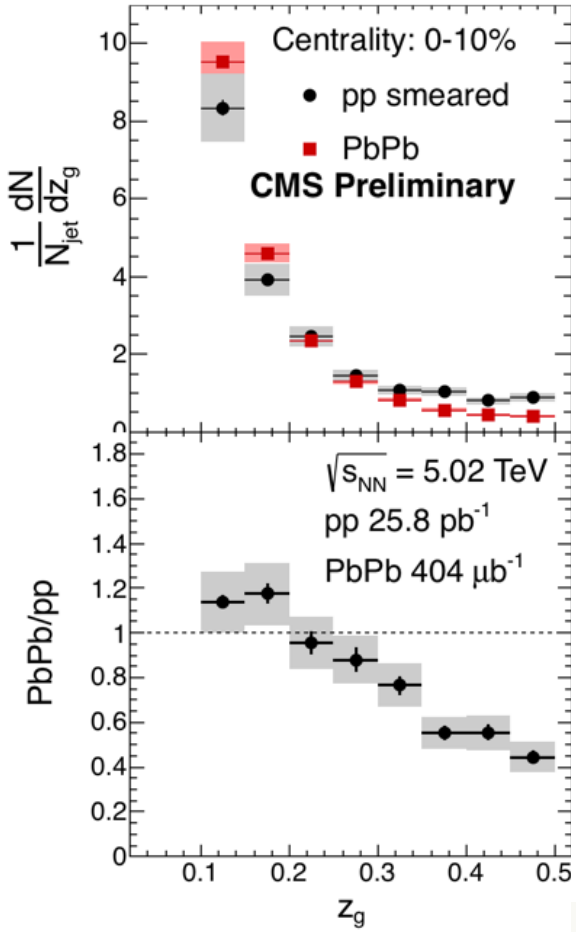
- Tracking design is now realized
  - Key aspect for looking at intra-jet correlations
    - Jet selection from calorimeters which removes autocorrelations
- Clustering needs to be continued to be evaluated
  - Calorimeter clustering → Important for γ observables
  - Requires track-cluster matching evaluation is importing
- Keep up with the changing face of jets in heavy-ion physics
  - Some observables still key (γ-jet)
  - Some observables are new (jet grooming)
  - Which are the best for day one physics analyses (most differential, cleanest comparison LHC results)

sPHENIX Jet structure goals

- Evaluate jet/single particle performance
  - Systematic studies versus jet kinematics and jet-finding characteristics are needed
  - Benchmark with new techniques given person-power/interest, for example evaluating particle flow with finalized tracking design
- Determine the best way to interface with JETSCAPE
  - http://jetscape.wayne.edu/jetscape/
  - Theory input will be valuable in determining the next generation of jet observables
- Jet Structure meeting next week
  - Follow up on tracking simulation, γ clustering, new observables

Example Observable z_g

- Observable: Momentum fraction carried by the subleading branch of first splitting
  - Independent of flavor (q/g fraction irrelevant)
  - Tracking only observable → Possible to evaluate now!



$$z_g = \frac{\min(p_{T,1}, p_{T,2})}{p_{T,1} + p_{T,2}}$$